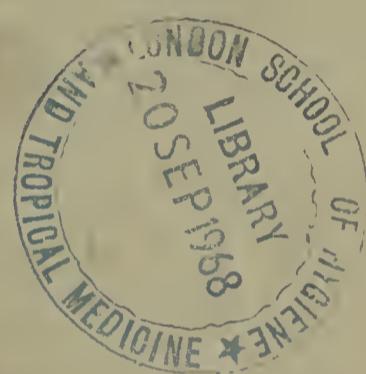


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REPORT
OF THE
MEDICAL RESEARCH
INSTITUTE

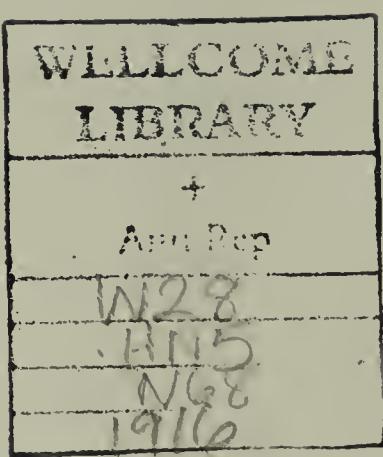
FOR THE YEAR

1916.



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MEDICAL RESEARCH INSTITUTE, LAGOS.

ANNUAL REPORT, 1916.

The eighth Annual Report is presented herewith.

The work done has been described under main headings which will be found in the index.

Dr. Connal was on duty from 1st January until 6th April and from 9th September until 31st December.

Dr. H. Sinclair Coghill was on duty from 2nd April until 31st December.

The post of Laboratory Attendant remained vacant throughout the year.

There were no changes in the native staff.

It was again a privilege to undertake the medical supervision of the adjacent Lunatic and Leper Asylums.

Meteorological records, which were taken daily, and the bacteriological analyses of the Lagos Water Supply, which were made regularly, are not included in this Report, as the figures can be found in the publications of the Departments concerned.

HELMINTHIASIS.

It is rare to find a sample of faeces from a native West African free from ova of one or more of the worms *Ascaris*, *Ankylostomum* and *Trichuris*.

The Ascaris, so far as the experience of this Laboratory goes, appears to cause little systemic disturbance, save occasional colic pains, sometimes constipation and seldom diarrhoea. Many of the ova present the larger longer oval of the unfertilised variety.

Trichuris ova occur in the faeces with much the same frequency as Ascaris, with this difference that whereas the latter is extremely rarely found in the stools from a European resident, the former are not at all uncommonly encountered. As with Ascaris, the pathological results of harbouring Trichuris are not prominent, but there are grounds for suspecting, particularly in Europeans, that some degree of anaemia is caused.

No exact statistics have been collected regarding the prevalence of these two worms, except as concerns the residents at the Yaba Lunatic Asylum.

During 1915 some observations were made as to the prevalence, signs and symptoms and treatment of Ankylostomiasis amongst the lunatics and the staff of that institution and further results will now be described.

It will be remembered that the conclusion was reached that the infection with Ankylostomes amongst these people was almost universal, that obvious signs of ill health due to the worm were absent and that the Thymol treatment, as carried out, had been of little avail in expelling the parasite. What follows, deals with the conditions eighteen months after the treatment.

One hundred individuals were examined. This number is made up of 51 lunatics and 20 members of the staff with 29 of their children. All these with the exception of one lunatic and eleven children were reported on in 1915. All the adults save one lunatic had received Thymol treatment in that year but only five of the children had been so treated.

The ages of the adults ranged from 30 to 50 years, those of the children from $1\frac{1}{2}$ to 17 years.

The usual physical examination of skin, chest and abdomen was made.

Thereafter the faeces were searched for parasites and finally the blood was examined, the Haemoglobin estimated by Tallquist's method, the red and white cells enumerated, a differential leucocyte count made, and notes taken of blood parasites and of changes in the red cells.

Ankylostome ova were found in the faeces of all. The diagnosis was made in each instance from a little of the faeces on the end of a match, slightly moistening the mass with tap water and examining under a $\frac{7}{8}$ " square coverglass, using a low magnification. It was not necessary in any case to resort to one or other of the methods for concentrating ova in faeces.

The eggs were found in this first sample in 71 cases. A second sample was necessary in 14, a third in 5 cases, a fourth in 2 and a fifth in one.

A second stool had to be examined in the remaining seven cases, and in four of these, a positive finding was not obtained until a third stool had been searched.

For convenience of description and comparison the cases have been allocated to four groups.

Group I consists of those in whose faeces there were the ova of Ankylostomum, Ascaris and Trichuris. Group II contains those who harboured only Ankylostomum and Trichuris. Group III is made up of those where Trichuris ova were absent but the eggs of the other two were present, and Group IV includes those who were infected with Ankylostomes alone.

There were 26 male lunatics. The details of those are set out in Table I. Nine fall into Group I. Cysts or free forms of *Entamoeba histolytica* were present in the faeces of six, spirochaetes in unusually large numbers occurred in two, and *Cercomonas* also in two, although there was no apparent intestinal irritation. No blood parasites were observed. The total red cells per cmm were distinctly below normal in three cases, Nos. 3, 6 and 7, and the haemoglobin percentage was subnormal in these also. A chronic cystitis was present in case 3, there was a large bleeding malignant ulcer of the foot in case 6 (he died from this cause in December) and case 7 was one of the two in which Spirochaetes were abundant in the faeces.

Group II includes seven of the twenty-six. The intestinal protozoa observed were *E. histolytica* in 6 and *Cercomonas* in two. Schistosome ova occurred in the faeces of one. Embryos of *Loa loa* were noted in the day blood of three.

The total red cell count was satisfactory in all as was also the haemoglobin percentage except in case 12, but the colour index in this last was normal.

The third Group comprises four individuals. *E. histolytica* was present in the stools of two and embryos of *Acanthocheilonema perstans* were noted in the blood of one. The blood-counts were practically normal, save in case 18 where the red cells just reached five million per cmm but the colour index was above unity.

Group IV contains six cases. The faeces of two contained *Balantidium* and *Giardia* was present in one. Embryos of *Loa loa* and of *A. perstans* were present in the blood stream of one patient each. Case 22 had a bladder infection with *Schistosomum* which explains the somewhat anaemic blood picture.

There is no clear evidence, therefore, amongst the male lunatics of a grave anaemia due to the presence of Ankylostomes and in no case were there oedema or any signs of cardiac involvement.

The number of female lunatics examined was twenty-five. Only two individuals come into Group I. One was infected with *Tetramitus*.

Group II includes the biggest proportion, namely thirteen. *E. histolytica* occurred in the faeces of 7, *Cercomonas* in one and *Giardia* in one.

Case 32 was distinctly anaemic, the mucous membranes being pale and the demeanour listless but there was no oedema.

Three cases make up Group III. *E. histolytica* was present in two and *Giardia* in one. The total red cell count was very low in case 43 but apart from this the patient was active and cheerful. Her age was about 50 years.

The remaining seven come into Group IV. *E. histolytica* was noted in five, *Cercomonas* in one and an unusually large number of Spirochaetes in one.

Embryos of *Loa loa* were seen in smears from the day blood in one and of *A. perstans* in another.

As regards the cellular content of the blood, the figures were satisfactory in all.

With the exception of cases 32 and 43, in which there was distinct anaemia, it cannot be said that the female lunatics suffered definitely from harbouring Ankylostomes. The full figures are in Table II.

The personnel of the staff consists of 12 males and 8 females.

Group I contains four males and one female. The intestinal protozoa were *E. histolytica* in one and *Cercomonas* in another. The blood counts are high.

Group II includes four males and 3 females. *E. histolytica* was present in 5 and *Cercomonas* in two.

Case 59, male, showed 0·4% Myelocytes (neutrophil). There was a certain amount of pallor of the mucous membranes, and physically a slow intelligence and a lack of energy which were all probably due to the effect of the Ankylostomes. Case 67, female, was passing small shreds of mucus, containing pus cells, erythrocytes and active *E. histolytica*, but there was no actual diarrhoea and the case was more probably one of chronic Dysentery than Ankylostomiasis.

Three males and two females are placed in Group III. *E. histolytica* was found in the stools of two, *Cereomonas* in one and *Balantidium* in one. Embryos of *A. perstans* were observed in the blood of one.

Case No. 69 (female) was distinctly anaemic and in the absence of other causes it must be presumed that the condition originated in the Ankylostome infection.

Group IV is made up of three cases which do not require comment.

Tables III and IV give all the details.

Amongst the children there were 21 boys and 8 girls.

Group I bulks largest, containing 11 boys and 4 girls.

Only two, one boy and one girl showed a definite anaemia, the signs in the boy being the more distinct. Case No. 80, he was aged 15 years.

There was a well marked poikilocytosis. The Eosinophils reached 47·8% in a total leucocyte count of 11,675 per cmm. The case was very probably one of Ankylostomiasis anaemia. The diagnosis was less certain in the case of the girl, No. 85, age 6 years, inasmuch as she harboured both *E. histolytica* and Quartan malarial parasites.

Group II is blank. Group III contains 12, 9 boys and 3 girls. The Haemoglobin percentage was 65 in case 93 (male aet 2 yrs) and case 97 (female aet 2½ yrs).

In both these individuals malarial parasites were plentiful, subtertian in the former and Quartan in the latter.

Group IV has two cases, a boy and a girl.

The details are set out in Table V.

The colour-index was calculated on a count of six million red cells as the male standard and five and a half million as the female standard.

Summarising, 38 male adults showed ankylostome ova more or less abundant, but never difficult to find and in none of these was there clear evidence of Anaemia due to the action of Ankylostomum. Thirty-three adult females, all showing ankylostome ova in the faeces, yielded only two cases in which reasonable grounds were present for believing that an anaemia due to the action of Ankylostomes had occurred.

Amongst 29 children there was only one, a boy of 15 years who definitely suffered from Ankylostomiasis anaemia.

Schistosomiasis. In addition to the two cases of this infection, noted above, two cases, one in a male child and the other in a male adult, both natives were seen in Lagos. Only one specimen of urine from each case was obtained, the ova being of the terminal spined variety in both.

A few adult male Schistosomes were obtained from the portal vein of an ox, slaughtered in Lagos.

Filariasis. Twenty-six blood smears collected from as many natives at Ikom and 14 from Etomi were received in December. Embryos of *A. perstans* were present in 11 of the former and 8 of the latter and embryos of *Loa loa* were also found in one of the 11 and one of the 8 cases. Two male lunatics and one female as already noted, also harboured *A. perstans*. Embryos of *Loa loa* were found in the blood of 5 lunatics, and in two Europeans at Ebute Metta.

Two labourers attached to the Institute complained on the same day (13/11/16) of "fever" and vague body pains. The temperature in one case registered 99°.6 and in the other 99° F. Embryos of *A. perstans* were very abundant in the blood. The patients received no treatment but were kept under observation. The temperature was normal on the following day, and within three days the embryos lessened greatly in numbers and the pains disappeared.

Embryos of *F. bancrofti* were found in the blood of one male native from Lagos.

Tæniasis. Ten specimens of *T. saginata* from natives were received, during the year, from Calabar.

One specimen of *Dipylidium* from a cow was sent from Lokoja.

Some adult *Trichuris* were received from Sapele, and some adult *Ankylostomum duodenale* from Ikot-Ekpene.

TABLE I.
MALE LUNATICS.

No.	Group.	Hb%	Total reds.	Total whites.	Intestinal protozoa.	Blood parasites.	Neutrophil %	Eosinophil %	Mononuclear clear %	Remarks.	Clostridial index.	
1.	I	90	5,700,000	6,250	E. histolytica	...	51·4	15·6	11·8	...	90/95	
2.	I	90	5,433,000	10,625	E. histolytica	...	47·8	17·4	8·8	...	90/90	
3.	I	75	5,166,000	6,875	E. coli	...	35·2	16·4	8·4	Chronic cystitis	75/85	
4.	I	95	5,800,000	11,250	E. coli, Spirochaetes	...	35	12·8	11	...	95/97	
5.	I	95	5,966,000	7,500	E. histolytica	Cercomonas	...	35·8	...	Malignant ulcer	95/98	
6.	I	70	4,766,000	18,125	Blastocystis	...	3·6	24	9·2	...	70/78	
7.	I	85	5,133,000	7,187	E. histolytica	Blastocystis	...	61·4	8·2	...	85/85	
8.	I	90	5,766,000	7,187	E. histolytica	Spirochaetes	...	28·4	15·2	...	90/95	
9.	I	95	5,600,000	9,870	E. histolytica	Cercomonas	...	10·8	13·6	...	95/93	
10.	II	95	5,450,000	8,650	Nil	...	37·2	5·2	21·6	...	95/90	
11.	II	90	5,633,000	12,500	E. histolytica	Blastocystis	...	8	11·2	...	90/93	
12.	II	85	5,133,000	13,125	E. histolytica	Blastocystis	...	11·2	29·2	...	85/85	
13.	II	90	5,363,000	9,900	Cercomonas	...	30	17·4	11·2	...	90/88	
14.	II	95	5,900,000	11,200	E. histolytica	...	33·8	19·2	18·2	...	95/98	
15.	II	90	5,600,000	10,625	E. histolytica	Cercomonas	...	50	6	23·2	90/93	
16.	II	90	5,500,000	10,000	E. histolytica	...	...	20·2	10·2	...	90/92
17.	III	95	5,633,000	11,250	E. histolytica	Blastocystis	...	24	14	...	95/93	
18.	III	95	5,033,000	6,875	E. coli	...	37·2	26·4	10·4	...	95/83	
19.	III	90	5,633,000	9,687	E. histolytica	...	...	17	16·2	...	90/93
20.	III	95	5,233,000	10,312	Blastocystis	39·4	10	14·4	...	95/88
					Embryos	46	7·4	16·4	...	95/88
					A. perspants	48	7	12·2	90/92	95/87
21.	IV	90	5,540,000	8,125	Nil	17·8	15·4	...	95/100
22.	IV	65	5,200,000	8,125	Giardia	18	14·2	...	90/87
23.	IV	95	6,040,000	11,250	Balantidium	95/93
24.	IV	90	5,233,000	6,875	Nil	38·2	21·8	12	...	95/93
25.	IV	95	5,600,000	8,750	E. coli	Blastocystis	...	46·2	9·2	6	...	95/93
26.	IV	95	5,600,000	9,375	Cercomonas	Blastocystis	7	22·2	...	95/93
					Balantidium	95/93
					Embryos	Loa loa	37·8	95/93

TABLE II.
FEMALE LUNATICS.

No.	Group.	Hb %	Total reds.	Total whites.	Intestinal protozoa.	Blood parasites.	Neutrophil %	Eosinophil %	Mononuclear %	Remarks.	Colour index.
27.	I	90	4,766,000	6,875	Tetramitus Blastocystis	..	38·8	21·4	11·6	..	90/86
28.	I	90	4,900,000	8,125	E. coli Blastocystis	..	63	6·2	11	..	90/89
29.	II	85	4,600,000	8,750	Nil	..	57·2	6	10·6	..	85/84
30.	II	90	4,800,000	8,125	E. histolytica Cercomonas	..	31·4	17	12	..	90/87
31.	II	85	5,166,000	8,750	E. histolytica	..	56·8	12	9	..	85/93
32.	II	85	4,233,000	5,937	E. histolytica Blastocystis	..	66·6	4	7	..	85/76
33.	II	85	5,066,000	7,500	Nil	..	39	13·6	18·6	..	85/91
34.	II	90	5,130,000	8,125	Giardia	..	..	42·2	10·6	..	90/93
35.	II	90	5,400,000	11,875	Blastocystis	..	..	57·8	5·6	..	90/98
36.	II	80	5,500,000	10,525	E. histolytica	Cercomonas	..	..	11·4	..	..
37.	II	90	5,533,000	8,387	Blastocystis	..	..	45·4	16	10·2	80/100
38.	II	85	5,200,000	11,875	E. coli, Cercomonas	Blastocystis	..	..	11·4	13	..
39.	II	85	5,533,000	6,562	E. histolytica	..	..	..	8·6	12·2	..
40.	II	85	5,200,090	6,875	E. histolytica, E. coli	..	..	..	22·6	12·6	..
41.	II	85	5,733,000	11,250	Blastocystis	..	..	..	..	..	85/100
42.	III	85	5,120,000	8,750	E. histolytica	Blastocystis	..	..	59·4	4·6	..
43.	III	85	3,966,000	6,562	E. coli	..	..	..	28·2	17·8	..
44.	III	90	5,200,000	9,375	E. histolytica	Giardia	..	..	60·4	7	..
45.	IV	85	5,133,000	9,375	E. histolytica	..	..	..	48·2	8·2	..
46.	IV	90	4,900,000	8,125	E. coli	Blastocystis	..	..	..	..	..
47.	IV	85	4,933,000	6,562	E. histolytica	Blastocystis	..	..	63	6·2	..
48.	IV	85	5,133,000	17,550	E. histolytica	..	..	..	41·6	7·2	..
49.	IV	90	5,100,000	11,250	Giardia	Cercomonas	..	..	68·2	3·8	..
50.	IV	90	5,163,000	13,750	E. histolytica	Spirochates	..	..	..	..	90/93
51.	IV	90	5,766,000	14,375	E. histolytica	..	..	..	..	..	90/93
					A. perstans	..	..	..	..	..	90/104
					Embryos	..	..	..	..	..	..
					

TABLE III.
ASYLUM MALE STAFF.

No.	Group.	Hb%.	Total reds.	Total whites.	Intestinal protozoa.	Blood parasites.	Neutrophil %	Eosinophil %	Mononuclear %	Remarks.	Colour index.
52.	I	95	5,733,000	8,725	Nil	...	52.8	4.2	9.6	...	95/95
53.	I	100	5,766,000	10,312	Cercomonas	...	44	11.4	9.8	...	100/95
54.	I	95	5,866,000	9,375	E. coli	...	46.4	6.8	13.6	...	95/97
55.	I	90	5,933,000	10,000	Nil	...	47.6	12	11.6	...	90/98
56.	II	95	5,700,000	11,875	Nil	...	32	23	15.6	...	95/95
57.	II	90	5,533,000	9,375	E. histolytica	...	24.4	13	18.2	...	90/92
58.	II	95	5,766,000	8,125	E. histolytica	...	50.4	3.6	13.6	...	95/95
59.	II	85	4,166,000	10,000	E. histolytica	...	22.4	10.8	21.6	...	85/68
60.	III	90	5,600,000	12,812	E. coli, Cercomonas	...	34	22.4	12.6	...	90/93
61.	III	95	5,533,000	10,000	E. histolytica	...	38	14.8	17	...	95/92
62.	III	90	5,900,000	8,750	E. histolytica	...	14	21	9.6	O. 6% pigmented	90/98
63.	VI	95	5,800,000	9,687	E. coli Blastocystis	...	31	22.4	12.6	O. 6% Mononuclears	95/97
										♂	

TABLE IV.
ASYLUM FEMALE STAFF.

No.	Group.	Hb%	Total reds.	Total whites.	Intestinal protozoa.	Blood parasites.	Neutrophil %	Eosinophil %	Mononuclear %	Remarks.	Colour index.
64.	I	85	5,433,000	9,375	E. histolytica	...	43.8	3.2	10.8	...	85/98
65.	II	90	5,666,000	10,625	E. coli, Cercomonas	...	...	...	...	...	90/102
66.	II	85	5,333,000	13,125	E. histolytica	...	47.2	5.2	10	...	85/96
67.	II	85	4,566,000	12,250	Blastocystis	...	46.4	15.1	2.6	...	85/82
68.	III	85	5,233,000	9,062	E. histolytica	...	55.2	7	18.2	...	85/95
69.	III	60	3,866,000	7,187	Balantidium	...	39.8	6	12.4	...	60/69
70.	IV	85	5,200,000	9,682	Nil	...	37.6	10.2	14.6	...	85/95
71.	IV	90	5,500,000	11,250	Cercomonas	...	37	7.4	17.6	...	90/100
					Blastocystis	...	48.2				

TABLE V.

No.	Group.	Sex.	Age.	Hb.	Total reds.	Total whites.	Intestinal protozoa.	Blood parasites.	Neutrophil %	Eosinophil %	Mononuclear %	Remarks.	Colour index.	
72.	I	M	13	85	5,933,000	7,812	E. histolytica Blastocystis ...	...	30·2	10·6	22·4	Pigmented Monos.	85/98
73.	I	M	6	85	5,500,000	10,937	E. histolytica ...	...	51·8	10·6	14·2	Myelocytes O. 2%	85/92
74.	I	M	10	90	5,833,000	11,250	E. histolytica Blastocystis ...	...	27·8	9·6	26·8	...	90/97
75.	I	M	6	80	5,500,000	13,750	Nil ...	...	30·6	20·4	16·6	...	80/92
76.	I	M	14	90	5,700,000	6,875	E. histolytica ...	...	31·4	19·6	12·8	...	90/95
77.	I	M	5	85	5,500,000	16,250	Nil ...	...	30·8	20·8	14·4	...	85/92
78.	I	M	2	80	4,333,000	12,812	Nil ...	...	28·2	5	35·4	...	80/72
79.	I	M	9	85	5,666,000	9,375	E. histolytica ...	...	33·2	15·8	25·4	...	85/93
80.	I	M	15	55	3,166,000	11,675	Nil ...	...	33·2	15·8	47·8	Poikilocytosis.	55/52
81.	I	M	6	85	5,100,000	9,375	E. histolytica ...	...	25·8	92	92	...	85/85
82.	I	M	8	80	5,400,000	12,500	E. histolytica Blastocystis ...	...	21·2	12·4	15·8	Normoblasts Poikilocytosis.	80/90
83.	I	I	F	12	90	4,766,000	7,812	Quartan young.	...	46·8	14·6	14·6	...	90/86
84.	I	I	F	10	80	5,933,000	9,375	Nil	20·6	8	29·2	O. 4% Myelocytes.	80/107
85.	I	F	6	75	4,833,000	11,875	E. histolytica ...	...	54·2	16·8	14·6	O. 4% Myelocytes.	80/107
86.	I	F	10	85	4,866,000	7,500	Nil ...	...	49·6	12·6	12·6	...	75/87
87.	III	M	14	85	5,033,000	6,250	E. histolytica Blastocystis ...	...	32	9·6	18·4	...	85/87
88.	III	M	11	90	5,733,000	10,000	E. histolytica ...	...	33	20·2	15·4	...	85/85
89.	III	M	9	85	5,833,200	8,125	E. histolytica ...	...	28·2	17	17·8	...	90/95
90.	III	M	9	85	5,500,000	8,750	E. histolytica ...	...	31	20·8	16·2	...	85/97
91.	III	M	5	85	5,500,000	7,812	Nil ...	...	43	13	10	...	85/92
92.	III	M	11	90	5,800,000	10,000	E. coli Blastocystis ...	...	27·2	27·8	14·6	...	90/97
93.	III	M	2	65	4,800,000	12,500	Nil ...	...	32	19·8	13	...	65/80
94.	III	M	1½	85	5,230,000	12,125	Mite ...	...	47·6	16·8	17	...	85/87
95.	III	M	13	85	5,533,000	10,000	E. coli Blastocystis ...	...	35·2	3·4	30	...	85/92
96.	III	F	15	90	4,966,000	7,187	E. histolytica ...	...	25·6	20·6	20·4	...	90/89
97.	III	F	2½	65	5,266,000	8,387	Nil ...	...	11·4	7·2	27·4	...	56/94
98.	III	F	12	95	5,800,000	7,500	E. histolytica Blastocystis ...	...	25	12	12	...	95/105
99.	IV	M	4	85	4,266,000	8,125	Nil ...	...	31·8	17·4	15·8	...	85/70
100.	IV	F	17	85	5,600,000	8,750	E. histolytica Blastocystis ...	...	43·2	8	7·6	...	85/102

BLACKWATER FEVER.

The Annual Report on the occurrence of this disease in Nigeria during 1915 was not prepared, as, for various reasons the returns were incomplete and some cases were merely notified, no particulars, being furnished. It is now proposed to synopsise such information as has been collected during 1915 and 1916.

More or less complete data concerning 39 cases, have been supplied of which number 28 occurred in 1915 and 11 in 1916. Sixteen were reported from the Northern and 23 from the Southern Provinces, but it must be clearly understood that cases occurred in both years and in both Provinces, details of which are not to hand.

The cases came from the following places where Blackwater Fever has been known to occur previously, Lagos (including Ebute Metta and Iddo) (10), Minna (2), Zaria (2), Ibadan (2), Kano, Lokoja, Zungeru, Ilorin, Benin City, Warri, Degema, Brass, Forcados and Aro. The places where previous cases had not been known were Quall, Tilde Filani, Kuti Wenji, Abinsi, Bisichi, Gona Creek, Faiki, Nafada, Itu, Uromi, Otampa, Nomeh, and Patani.

The ages of the patients were 20, 22, 24 (4), 25 (2), 26, 27 (9), 28, 29, 31 (2), 33, 34 (3), 35 (2), 36 (2), 37, 39, 40 (3), 42, 45, 49 and 56 years.

All were of British birth and nationality except 10, of which number there were 3 West Indians (negroes), 2 "Syrians," 2 Italians, 1 French, 1 German and 1 West African Negro.

All were males except one.

The number of cases occurring in the different months was, January 2, February 2, March 3, April 0, May 0, June 3, July 4, August 4, September 5, October 7, November 6 and December 3.

As regards the period spent in the tropics, 26 had no experience other than in West Africa.

The total periods in these cases were $9\frac{1}{2}$ years, 9 years (2), 8 years, $7\frac{1}{2}$ years, 7 years (2), 4 years (3), $3\frac{1}{2}$ years, 3 years (4), $2\frac{1}{2}$ years (3), 2 years (4), $1\frac{1}{2}$ years, 14 months, 13 months, and one some years. The negro had spent his 24 years in Nigeria.

The tropical experience of the remainder was—

- (1) 19 years, Rhodesia, East Africa, Angola and 1 year in West Africa.
- (2) "Many years" in South Africa and Gold Coast and 2 months in Nigeria.
- (3) "Some years" in Cyprus and 4 years in Nigeria.
- (4) 8 years "off and on" sailing between Liverpool and West Africa.
- (5) 7 years in East Africa and 10 years in West Africa.
- (6) "Sometime" in British Honduras and 2 years in Nigeria.
- (7) "Had lived in Malay States" and 14 months in Nigeria.
- (8) "All over the East, as a sailor" and 3 years in West Africa.
- (9) 32 years in Trinidad (West Indian) and 2 years in Nigeria.
- (10) 24 years in West Indies (West Indian) and 8 months in Nigeria.
- (11) 22 years in West Indies (West Indian) and 8 months in Nigeria.

(12) "Syrian" much travelled, and 2 years in Nigeria.

(13) "Syrian" much travelled, and "many years" in Nigeria.

It is to be understood that except in the case of the West Indians, the Syrians, the Negro, and seven others, one of whom had spent 7 years, three of whom had spent about 3 years and the other three about 2 years or less in Nigeria, the usual few months of leave had been enjoyed at home.

The length of the tour in which the disease was contracted, was one month, two months (3), three months, four months (3), six months (2), eight months (3), nine months (3), ten months (2), eleven months (3), twelve months (3), fifteen months, twenty-one months, twenty-four months (3), two and a half years, three and a half years (3), and seven years. It was given as "many years" in one case.

Government officials numbered 19 and non-officials twenty.

Six patients had previously suffered from Blackwater Fever, and two of these had had two previous attacks. The interval between the last and the present was 3 months, 7 months, one year, 2 years, "two attacks in the previous three years," six years and seven years.

There was a definite history of antecedent attacks of malaria within the preceding six months in every case with the exception of one where it was stated there had been no malaria.

Regarding the prophylactic use of Quinine it was stated to be "regular" in four cases, "five grains daily" in five cases. It was "every other day," "twice a week" frankly "irregular" or "only when feeling unwell" in the remainder.

The particular salt used in prophylaxis was mentioned in 18 cases. The Bisulphate was used in 9, the Hydrochloride in 5, the Sulphate in 2, and the Bihydrochloride and Euquinine in one each.

Information regarding the administration of quinine immediately prior to the attack of Blackwater Fever is incomplete in many instances. The data respecting 24 cases have been included in Table VI.

Rigor is mentioned as having occurred in 17 cases, an hour or two before the passing of blackwater in 13 and shortly after the appearance of haemoglobinuria in four. It was definitely absent in four. Jaundice was noticed in 31 cases. It appeared on the first day of illness in 25, it was first observed on the second day in 2 and it was merely noted as "present" in 4 cases.

Pain was complained of by 21 patients. It was referred to the loins in 8, to the back in 5, it was "abdominal" in 3, "epigastric" in 2, "hepatic" "over the spleen" "round the umbilicus" "at the back of the neck" in one case each, the limbs ached in two instances and headache was present in seven individuals. Four patients made no complaint of pain.

Vomiting occurred in 33, slight in the mild cases and persistent in the severe. There was no vomiting in two cases.

Enlargement of the spleen was noted in three cases.

As regards unusual clinical features, ascites and oedema of the scrotum occurred in one case, sore lips and gums, a septic throat, and impairment of near vision also come into this category.

The fear of impending death was present in one case which recovered.

Diarrhoea was noted in 3 cases and frequency of micturition in two.

TABLE VI.

* The same case.

Distension of the abdomen, hiccough, and suppression of urine characterised five fatal cases.

The duration of haemoglobinuria was 8 days, 7 days, 6 days (4), 5 days (3), 4 days (6), $3\frac{1}{2}$ days, three days (9), $2\frac{1}{2}$ days, 2 days (5), $1\frac{1}{2}$ days (3), one day, 16 hours and 12 hours.

There were three cases of relapse. The interval was 7 days and the duration of the haemoglobinuria in the relapse 2 days, in one case, 2 days and one day respectively in the second case, and in the third, information was received of a relapse on board ship the patient having been invalided as soon as he was fit to travel after his primary attack.

Death resulted in 8 cases, in two of which there was a history of a previous attack of Blackwater Fever.

The blood was examined in 31 cases. The day of disease on which the smears were taken is not stated in 11 and the results of these were "no parasites" in 9, "subtertian" in one, and "no parasites; haemoglobin 70%; red cells 4,400,000 per cmm; white cells 4,900 per cmm; large mononuclears 18%" in one.

It so happened in one case that blood smears were obtained two days before, one day before and on the actual day of the onset of the haemoglobinuria. Subtertian rings were few in the first set of smears, numerous in the second set, and absent in the third. Pigmented mononuclears were present in the last two. Anisocytosis was a feature of all 3 sets of slides. The differential leucocyte counts were :—

	Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Eosino-phil.	Transi-tional.	Mast cells.	Myelo-cytes.
2 days before	57·2	21·2	3·8	6·4	3·4	7·8	0·2	...
1 day before	52·4	20·4	12·2	7·2	3	4·2	0·6	...
Day of onset	61·4	22·2	5·8	6	1	3·2	0·2	0·2

The blood was examined on the day of onset in five other cases. The results in two were merely "one parasite," in one case, and "no parasites" in the other.

Differential leucocyte counts were made in the remaining three :—

	Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Eosino-phil.	Transi-tional.	Mast cells.	
I ...	56·2	17·4	10·4	9·6	1	5	0·4	One erythrophage (mononuclear).
II ...	67	7·4	3·2	6	16·4	...	...	Anisocytosis.
III ...	81·6	5	1·4	8·4	1	2·4	0·2	Aniso-poikilocytosis.

No parasites and no pigmented mononuclear cells were found in any of these three cases. Several differential counts were made in the last case :—

	Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Eosino-phil.	Transi-tional.	Mast cells.	Myeto-cytes.	Normo-blasts.	Megalo-blasts.
1st day ...	81·6	5	1·4	8·4	1	2·4	0·2	...	...	...
2nd day ...	82	2·8	1	11·2	...	2·4	0·6	...	...	...
3rd day ...	64	11·4	4	17·6	0·4	2·6	...	...	...	...
4th day ...	50	18	6·6	20·4	3·2	1·8	...	...	...	...
5th day ...	63·4	8·6	2·8	14	2	2·4	0·4	4·6	1	0·8
7th day ...	60·2	8·6	3·2	19·4	3	4	...	...	...	1·6
13th day ...	66·4	13	4·2	9·2	4·2	2·8	...	...	0·2	...

On the second day mononuclear erythrophages were 0·8% ($\frac{1}{4}$ in 500 leucocytes), one having ingested one red cell, another 3, another 5 and the fourth was merely vacuolated.

On the third the erythrophages were 1·6% (one with 1, and one with 3 red cells ingested). On the fourth day the percentage was 0·8, on the fifth 0·4 and on the seventh day they were 0·6%. They were not observed on the thirteenth day.

The blood was not examined until the second day of illness in five cases. In two of these the results given are merely "no parasites; some pigmented mononuclears" and "no parasites; large number of transitionals" respectively. Differential leucocyte counts were made in the other three.

	Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Eosino-phil.	Transi-tional.	Mast cells.	Myelo-cytes.	Normo-blasts.
I. 2nd day	71	8·6	2·2	10	...	6·6	0·2	1·4	...
3rd day	62	8·8	3·2	17·6	1·8	6	0·2	0·4	...
5th day	65·4	11·4	2·4	11	0·8	7·2	0·4	1	0·4

No parasites or pigmented mononuclear cells were seen on any occasion but anisocytosis, poikilocytosis and basophilia were noted. Erythrophages (mononuclear, vacuolated) were 0·8% on the second day, 2·2% on the third and 1·6% on the fifth day.

	Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Eosino-phil.	Transi-tional.
II. 2nd day	75	10·6	5·6	7·6	...	1·2
3rd day	67	15·4	8·2	5·4	0·6	3·4

No parasites and no pigmented leucocytes were seen in this case but there was obvious inequality in the size and shape of the red cells. No erythrophages were encountered.

	Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Eosino-phil.	Transi-tional.	Mast cells.	Myelo-cytes.	Normo-blasts.
III. ...	63·4	10·2	5·4	10·4	0·2	2·4	0·2	7·6	0·2

There was distinct poikilocytosis. The erythrophages were 0·2 per cent.

An examination of the blood was first made on the third day of illness in 3 cases. The findings were (1) "no parasites" (2) "no parasites; a few pigmented mononuclear leucocytes; haemoglobin 60%; polymorph 59·42%, large and intermediate mononuclears 12%, small mononuclears 31%, eosinophils 1·5%" (3) "no parasites; haemoglobin 50%; polymorphs 67·5% large and intermediate mononuclears 14%; small mononuclears 18·5%."

Blood smears were first taken on the fourth day of illness in three cases. In the first case, the patient was not seen until the 4th day and he died a few hours thereafter. The results of the examination were that no parasites were found but a few pigmented mononuclear cells were observed. There was considerable poikilocytosis.

The differential leucocyte count was:—

Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Transi-tional.	Mast cells.	
37·5	5·6	11·4	41	4·4	0·1	(1,000 leucocytes counted).

One thousand mononuclear leucocytes were then examined and it was found that those of endothelial origin amounted to 32%, three of these cells containing malarial pigment.

Five hundred endothelial cells were next scrutinised, 74·6% had no ingested red cells, 20% had one, 4% had two, 0·8% had three and 0·6% had four ingested red cells. During this last count, one normoblast was met with.

The results in the other two cases were (1) "no parasites; several pigmented leucocytes; many abnormal shaped R.B.C.; Polymorphs 60·9%, large and intermediate mononuclears 22·8% small mononuclears 8·5%, eosinophils 7·1%, mast cells 0·4% and haemoglobin 30%", (2) "no parasites, haemoglobin 70% polymorphs 55·5%, large and intermediate mononuclears 12%, small mononuclears 31%, eosinophils 1·5 per cent."

The blood was first examined on the 6th day of illness in one case. There were stippling and polychromasia of the erythrocytes and anisocytosis and poikilocytosis. No parasites nor pigmented mononuclear cells were seen. The differential leucocyte count was:—

Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Eosino-phil.	Transi-tional	Mast cells.	Myelo-cytes.	Normo-blasts.
57·8	12·8	5·6	6·2	2·2	0·4	0·2	12·2	2·6

Five hundred myelocytes (they were all neutrophil) were classified according to the shape of the nucleus as under:—



240



164



49



47

The remaining two cases in which a blood examination was made were:—

Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Transi-tional
I 7th day	63	23·8	7·2	5·4

There were no parasites and no pigmented mononuclear cells and there were many normoblasts.

Poly-morph.	Small lymph.	Large lymph.	Mono-nuclear.	Eosino-phil.	Transi-tional.	Myelo-cytes.	Normo-blasts.
II 8th day	73	9·4	5·4	6·2	0·6	3·8	0·6

No parasites, but a few pigmented mononuclear cells were seen, and anisocytosis was evident.

Dr. L. H. Booth has added a note on the urine to the description of one of his cases.

"A striking fact was the very high degree of acidity of the urine, all through the illness. The urine kept for 24 hours in bulk without turning putrid at all. The daily quantity was from 70-90 ounces all along. The first specimen passed free from haemoglobin was almost colourless and the next few specimens, instead of being highly acid were neutral, with a phosphatic deposit. Later on, each specimen became

highly acid again, and highly coloured, containing much bile, but the specific gravity did not vary, remaining at 1,015 throughout. This continued for 4 days.

The urine then became more or less normal. Glucose had been administered throughout the illness, and it was stopped at about the time when the urine became normal. The urine at times had a peculiar odour, similar to acetone. Profuse drenching sweats were common every day. It seems as if many of the symptoms in the case may have been accounted for, by an Acidosis."

Dr. A. H. Wilson has also sent notes of his case in a negro, at Benin City. "Sambo. Ejaw tribe. Male. Age 24.

Came to Hospital, January 8th 1915, complaining of 'feeling cold, with slight headache.' Temperature 101°F. He stated his urine was black, and he passed, on request, 4 ounces of porter-coloured urine. The specific gravity was 1,025 the reaction neutral; albumen about $\frac{1}{4}$, deposit on standing, greyish brown, consisting of granular debris, granular casts and a few red blood corpuscles. The blood film on this date showed no parasites.

He is a robust healthy strong man, not anaemic and showing no sign of being ill.

The only history obtainable from him regarding the present illness is that he has been feeling cold for 10 days and passing black urine for 3 days.

His past history is that during the last three years he has had three attacks of "Blackwater," this being the third. During the two previous attacks the Blackwater lasted 2 months, not every day during this period but for 1 to 3 days at a stretch, associated with shivering, the non-Blackwater periods extending from 2 to 4 days. He does not appear to have been seriously ill at these times, nor to have had any severe symptoms; sometimes there was vomiting, but not always and never severe, no pain or tenderness in Epigastrium, no loin pain, no Jaundice.

The course of the present illness has been as follows:—the urine contained haemoglobin up to 14th January, steadily decreasing and the albumen steadily decreased also, ceasing on the same date.

During this period the patient's general condition remained good. There were no marked symptoms of any sort. There was slight vomiting on two days only, 8th and 10th January. There was no pain or discomfort anywhere and no jaundice at any time. The temperature fluctuated between 101°F and 98°F until the first week in February."

It is necessary to insert here some comments on "Studies in Blackwater Fever, V. On the importance of furnishing population statistics in connexion with cases of Blackwater Fever", by J. W. W. Stephens, Annals of Tropical Medicine and Parasitology Vol. X No. 3 pp 345–356.

It is impossible to disagree with the suggestions of this author as regards the collection of statistics. It is true that such statistics as are furnished are incomplete. Dr. Stephens' paper, properly read must be understood to be not a complaint against those who forward the facts of the cases, but rather as a powerful plea for a real investigation into the nature of the disease. At present it is impossible to state the number each month, in stations where a case of Blackwater Fever occurs (a) of officials (b) of non-officials (c) of Syrians, Asiatics, West Indians, etc. (d) of natives, nor their age periods, nor their African service, nor their previous attacks of Blackwater Fever, nor their attacks of Malaria during the previous six months, nor the quinine prophylaxis, nor the proportion of the sexes. A few figures might be obtained in small stations.

CASE I.



May, 1916.



December, 1916.

CASE II.



May, 1916.



December, 1916.

Not one, but many whole-time statisticians would be required and such observers would have to remember amongst other things that it is given to few officials, non-officials and others to remain long in one station, that "a go of fever," in West Africa is, to many, Europeans and natives alike, less upsetting than a "common cold", and forgotten within a week or two, and also that while there are over 17 million inhabitants of Nigeria there are less than fifty qualified medical men to attend to their illnesses.

LEPROSY.

The method of treatment of this disease, described by Surgeon Victor G. Heiser, U.S. Public Health Service, in his Report "Leprosy. Its treatment in the Phillipine Islands by the hypodermic use of Chaulmoogra Oil Mixture" has been tried with some of the inmates of the Yaba Leper Asylum.

The treatment was begun in May, 1916 so that it is as yet too soon to make a complete report, more particularly as all the patients are old-standing cases.

The outstanding results only are described, and some photographs are attached.

The oil-mixture used was that recommended by Heiser, Chaulmoogra oil 60 cc, Camphorated oil 60 c.c. and Resorcin 4 grains. The mixture was sterilised by boiling, and 2 c.c. injected intramuscularly into the buttock, were given as an initial dose. After the lapse of one week, 3 c.c. were given and this dose was increased by 1 c.c. per week until 8 c.c. were being administered. Beyond this amount some discomfort was complained of, so that the procedure finally adopted was to inject 6 c.c. twice a week. This dose was well tolerated and every case responded to treatment. The most rapid and obvious effect was the healing of ulcers, many of them large and deep, and of many years' duration. Softening, then absorption of the nodules, fading of the maculae and the return of sensation were also observable, even to the patients themselves. Seven cases have been selected for description.

Case I, Male. Age 38 years. Inmate of Asylum for 4 years. First noticed the disease 11 years ago.

Face leonine. Skin of face infiltrated and yellowish in colour.

Nodules on cheeks, ears, lips and nose.

Anæsthetic patches, both arms and both legs.

Maculae right hand and both legs.

Treatment begun 19.5.16.

By December, 1916, the nodules had been considerably absorbed, particularly in the lips, nose and ears. The photographs show distinct wrinkling where absorption has taken place, and the lips, nose and ears are smaller. Sensation has returned in both arms, but only slightly in the legs, whilst the maculae have disappeared except from the lower part of the legs.

Case II, Male. Age 21 years. Inmate of Asylum for 6 years. First noticed the disease 7 years ago.

Leonine expression. Skin of face thickened. Large nodules over and between eyebrows and on nose, cheeks, ears and lips.

Anæsthetic patches, both arms and both legs.

Maculae on shoulders, back, buttocks, chest and abdomen.

Treatment begun 19.5.16.

By December, 1916, the nodules on cheeks, lips, ears and nose had in great part been absorbed. The anaesthesia had disappeared from the arms except for a small area on the left.

The maculae had completely disappeared.

Case III, Male. Age 40 years. Inmate of Asylum for 11 years. First noticed the disease 24 years ago.

Greater part of both arms from elbow downwards, anaesthetic.

Similarly with both legs from knee downwards, and also an area above right knee. Also two areas on the back of the trunk.

Many maculae on chest, abdomen, shoulders and back.

Treatment commenced 19.5.16.

By December, sensation had returned to both arms except from the wrist downwards.

The anaesthesia had also disappeared from the area above the right knee, and below the knee in both legs a slight recovery of sensation had taken place.

The maculae had completely disappeared except from the abdomen, where they were becoming more faint.

Case IV, Male. Age 30 years. Inmate of the Asylum for 3 years. First noticed the disease 7 years ago.

Both arms anaesthetic, left from two inches above elbow, and right, from just below elbow, downwards. Patches of anaesthesia over left ankle and foot; and right leg from below knee completely anaesthetic.

A deep ulcer, active over 2 years at the base of left middle finger, extending down into the palm. An ulcer also on stump of left ring finger.

Treatment begun 19.5.16.

By December, sensation had returned to the left arm as far as the elbow (downwards there was still anaesthesia) and on the right arm sensation was present as far as the wrist. There was complete sensation in the left leg, but only a slight return in the right.

Both ulcers had completely healed.

Case V, Male. Age 45 years. Inmate of Asylum for seven years. Disease started "when a small boy."

Anaesthesia over left arm from elbow downwards except for a small area at back of wrist. The left knee and foot are anaesthetic.

Patches of anaesthesia back and front right leg, below knee.

A large deep ulcer $2\frac{1}{2}$ " in diameter on sole of left foot.

Treatment begun 28.9.16.

By December, sensation had been completely restored to the left arm and right leg. Over the left knee also sensation had returned but there was little improvement below the ankle.

The ulcer had completely healed.

Case VI, Male. Age 25 years. Inmate of Asylum for two months. First noticed the disease two years ago.

The face and the back of the head and neck, with numerous maculae, all anaesthetic.

Treatment begun 5.6.16.

CASE IV.



May, 1916.



December, 1916.

CASE V.

Large deep ulcer,

$2\frac{1}{2}$ inches in diameter,

sole of left foot.



September, 1916.

December, 1916

CASE VII.



September, 1916.



December, 1916.

By December, 1916, sensation returned, except to a small patch over occipital prominence.

Maculae have disappeared except from left cheek.

Case VII, Female. Age 50 years. Inmate of Asylum for 12 years Disease started 24 years ago.

Both wrists and hands anaesthetic, also some anaesthetic patches on right upper arm. Complete anaesthesia below knee, lower two thirds of left leg.

Maculae on left breast and both upper arms.

A large, deep, ragged ulcer middle third of left sole. Another ragged ulcer over area formerly occupied by base of left toes.

Treatment begun 28.9.16.

By December, 1916, sensation had been restored in the right upper arm and there was a slight improvement at the wrists. Sensation had returned half way down the left leg. The ulcer which occupied the area at the base of the toes had healed and cicatrised and the ulcer on the sole was filling up with healthy granulations.

Thanks are gratefully given to Dr. Pickels, Principal Medical Officer, Northern Provinces, Nigeria, for suggesting this course of treatment.

It should be added that Guaiacol Carbonate in five grains doses twice daily was found useful in controlling the febrile disturbance.

SPIROCHÆTOSIS.

Spirochaetes similar to Spirochaeta eurygyrata, Werner emend. Fantham, were observed in the faeces of 3 European and 35 native patients suffering from dysentery or diarrhoea and in 1 European and 27 native healthy individuals. The total number of the former examined was 102 Europeans and 156 natives. The number of healthy individuals was 29 Europeans and 170 natives.

For staining purposes Giemsa's method was employed. The smears were made in the usual manner and fixed whilst wet in osmic acid vapour. They were then placed in absolute alcohol to harden.

In fresh specimens from faeces examined a few hours after being passed, the movements of these parasites were exceedingly rapid, consisting of a regular wave-like flexion of the body by means of which they were able to move backwards or forwards with equal facility and a corkscrew movement especially noticeable when in contact with faecal matter. The more rapid the movement the greater the number of waves or curves of the body observed in the same organism. In stained specimens the number of these varied between 2 and 10, depending also a good deal on the length of the parasite and to a lesser extent on its relative thickness—the thicker the parasites the smaller the number of waves and *vice versa*. In the very short members the movement was far more erratic.

As a rule the ends of the parasite were more or less pointed. No vacuoles were noticed in the body itself, but occasionally a diffuse nucleus in the form of chromatin granules could be made out.

The length varied greatly being 3 μ . in the shortest to a little over 14 μ . in the longest. With regard to breadth two varieties were noted, one being distinctly thicker and staining deeper than the other. To arrive at the exact measurement of these was not easy. The thickest would be probably rather less than 0.2 μ .

The organisms can remain alive for several days if kept in moist faeces at room temperature. In faeces contaminated with urine they were found alive 2 days after being passed and in uncontaminated faeces they survived to the 4th day.

No untoward symptoms were noticed in Monkeys and Guinea pigs fed with generous doses of these parasites.

CONCLUSION.

It would appear that spirochaetes similar to *S. eurygyrata* do not of themselves give rise to dysenteric or other inflammatory conditions of the intestine, though owing to the increase in their number when these symptoms are present it is possible that though not the direct causa agent—they may help to aggravate the inflammatory process or it may be that the conditions are more favourable to their multiplication than those met with in health.

Another spirochæte differing in many ways from the above was found in a specimen sent for examination by Dr. Gray of Lagos.

The patient, a European had been admitted to hospital with dysenteric symptoms.

Upon examination no amoebæ were to be found in the faeces—the only parasite observed being a fairly large spirochæte easily detected with $\frac{1}{7}$ in. objective and 3 in. ocular.

Accident destroyed the only permanent specimens obtained—before the characteristics of the parasite could be more fully studied.

In the living state there was not the great variation in size as observed in *S. eurygyrata*—the average length would be roughly 12 μ .

The most noticeable feature was the breadth of the body. This was certainly not less than 2 μ .

The movement was much slower and the waves of the body larger and fewer in number—4 or 5 at most. The corkscrew motion was also less frequently noted. The ends of the organism were tapering but not so pointed.

The parasite did not survive in faeces kept after the 2nd day.

The following short notes on the case have kindly been supplied by Dr. Gray.

"Mr. H. J. R. was admitted to Creek Hospital, Lagos, on June 12th, 1916, complaining of feeling weak and of pain in the stomach and hepatic regions.

Previous History.—Patient had done many tours in this Colony and had many attacks of malaria, none of them serious. He had never had dysentery or any other serious complaint apart from the attacks of malaria which he did not regard as serious.

Present Condition.—Patient looked ill. His skin and conjunctivæ had a subicteric tinge. His tongue was thickly coated.

Examination of the chest was negative.

Abdomen.—Tenderness was marked in the epigastric and hepatic regions, both spleen and liver were palpable.

Tenderness was felt in both iliac fossæ.

Urine.—Clear, amber colour, acid, Sp. Gr. 1,015, no albumin.

Course and Treatment.—01. Ricini $\frac{1}{2}$ oz. was given on the evening of admission and the morning stool was a curious orange colour and contained much blood and a little mucus.

Calomel gr. $\frac{1}{6}$ followed by a saline was given and the stools examined for amoebæ, but with negative results. In case the disease might prove to be bacillary dysentery, salines, $\frac{1}{2}$ oz. of sodium sulphate in hot water was prescribed hourly and also emetine gr. $\frac{1}{2}$ hypodermically was given daily. Before the emetine was given a specimen of the stool was sent to Doctor Coghill at the Medical Research Institute, Yaba. Doctor Coghill reported the absence of amoebæ and the presence, in large numbers, of an unfamiliar spirochæte.

It was thought that the condition might be one of spirochæte dysentery and treatment by salvarsan was proposed to and accepted by the patient; 0.25 grms. of kharsivan was injected intramuscularly into the buttock and 0.25 was injected into the lower bowel in the form of an enema. These injections were given on the 16th June.

Improvement was immediate and rapid. On the 19th of June blood and mucus were absent from the stool. Doctor Coghill reported on the 18th that the spirochætes were absent from the stool. The patient's condition improved remarkably in every way. On the 26th June, a little mucus was present in the stools but the spirochætes still remained absent. Amoebæ were never found at any time.

On the 26th, the patient felt so well that he left hospital in order to return to England. In the stool of that same morning Dr. Coghill found that the spirochætes had returned in smaller numbers and in what appeared to be a smaller type.

I advised Mr. R. to consult Doctor D. on his return to England. I do not at present know anything of the further progress of the case."

After four months leave in England, this patient returned to Lagos. The faeces were re-examined but no spirochætes were found.

Smears from six penile sores, and from three ulcerative skin conditions elsewhere were examined. *Spirochæta pallida* was found in three of the former.

AMOEIASIS AND OTHER INFECTIONS DUE TO INTESTINAL PROTOZOA.

As noted under Spirochætosis, the faeces of 457 individuals were examined, in a search for intestinal protozoa. Two hundred and fifty-eight of these individuals suffered from intestinal disturbance as evidenced by dysentery or diarrhoea; of this number, 102 were Europeans and 156 natives. Cysts or active forms of *Entamoeba histolytica* were found in the stools of 39 Europeans and 106 natives. The diagnosis was made under the belief that only one species of pathogenic intestinal entamoebæ existed. Had the description of *E. nana* been available possibly some of the forms met with would have been classed under that name. These entamoebæ were the only protozoa (excepting spirochætes) found in 32 Europeans and 93 natives. In the other cases they were associated with one or more of the other protozoa.

Regarding the 199 healthy individuals (29 Europeans, 170 natives) cysts of *E. histolytica* were found in the faeces of fifty-three natives.

Tetramitus (Macrostomum) mesnili was found in seven healthy natives and in 3 European and 26 native patients.

Cercomonas hominis was observed in 15 healthy natives and in one European and 6 native sufferers from intestinal irritation.

Trichomonas intestinalis was not noted in any of the Europeans examined but it was found in the stools of 7 healthy and 9 sick natives. *Lamblia (Giardia) intestinalis* occurred in 4 healthy natives. Amongst those suffering from dysentery or diarrhoea, it was found in one European and two natives.

Balantidium coli also was not found in any of the Europeans. It was met with in 4 healthy natives and in three who had diarrhoea.

Blastocystis was met with in 32 healthy natives and in 96 who had dysentery or diarrhoea. It was found alone in the faeces in only 5 cases. Once it was noted along with *Balantidium*, once with *Tetramitus*, once with *Lamblia* and in 3 cases with *Cercomonas*. In all other instances it was associated with *E. histolytica*.

Four Europeans suffering from amoebic dysentery exhibited *Blastocystis* on the third or fourth day, when the symptoms had subsided under emetine.

A distinct seasonal influence was observed, during the course of these examinations. The largest number of individuals harbouring these parasites were met with during the wet season, and the parasites themselves appeared to be more abundant in the individual at that time of the year.

Faeces which had been mixed with urine were not included in the above analysis.

Two Tables are attached. Table VII includes the figures of all examinations and Table VIII deals with the cases in which only one species of protozoa was found causing the dysentery or diarrhoea.

From Table VIII it would appear that a spirochaete whose characters have not been fully studied, and also *Tetramitus mesnili* and *Lamblia intestinalis* are capable of causing an acute dysenteric illness.

Cercomonas hominis and *Trichomonas intestinalis* can give rise to diarrhoea.

TABLE VII.

	HEALTHY.		SICK.	
	European.	Native.	European.	Native.
<i>Spirochaeta eurygyrata</i>	29	170	102	156
...	1	27	3	35
<i>Cercomonas hominis</i> ...	0	15	1	6
<i>Trichomonas intestinalis</i>	0	7	0	9
<i>Tetramitus mesnili</i> ...	0	7	3	26
<i>Lamblia intestinalis</i> ...	0	4	1	2
<i>Balantidium coli</i> ...	0	4	0	3
<i>Entamoeba histolytica</i>	0	53	39	106

Giving results of examination of faeces from 457 individuals, for intestinal protozoa.

TABLE VIII.

Cases in which only one species of intestinal protozoa was present in the faeces.

	DYSENTERY.		DIARRHOEA.	
	European.	Native.	European.	Native.
<i>Spirochaeta sp</i> ...	1	0	0	0
<i>Cercomonas hominis</i> ...	0	0	0	1
<i>Trichomonas intestinalis</i>	0	0	0	2
<i>Tetramitus mesnili</i> ...	1	7	0	3
<i>Lamblia intestinalis</i> ...	1	2	0	0
<i>Balantidium coli</i> ...	0	0	0	0
<i>Entamoeba histolytica</i>	22	93	0	0

YELLOW FEVER.

One definite case occurred on a cargo boat which lay in Lagos harbour. The ship had just arrived from further down the coast, among the creeks.

According to the history the patient had been suffering from a febrile disturbance for three days before he was seen by a medical man, who was called in shortly after midnight. A few hours thereafter the patient died.

A post-mortem examination was made within 12 hours of death.

The body was that of a well nourished man of about 40 years of age.

Rigor mortis was present. The dependent parts were extensively discoloured.

There was no yellow colouration of the skin or of the conjunctivæ.

There were no petechia.

The handkerchief binding the chin, was stained red, and on removing it, the lips were seen to be covered with frothy bloods-stained mucus.

The body was warm on section. The subcutaneous and abdominal fat was abundant, light yellow in colour.

Lungs.—Old pleural adhesions, right apex.

Both lungs darkly congested, and profuse oozing on section.

No consolidation. No evidence of haemorrhage.

Heart.—Pale and flabby, empty of blood, and with no clots. No aneurism, no injury.

No petechia on pleural or pericardial surfaces.

Liver.—Pale brownish yellow, and mottled with congested veins. Substance friable.

Gall bladder moderately full of dark thick bile, no inflammation.

Spleen.—Not enlarged, but deeply congested and quite diffused.

Kidneys.—Deeply buried in fat. Acutely congested.

Stomach.—Quite empty. Over the major portion of the greater curvature there was extensive ecchymosis and a distinctly granular appearance of the mucous membrane but no actual ulceration.

Small intestine, nothing abnormal, contents a yellowish white granulous material.

Large intestine; nothing noteworthy.

Bladder walls injected. Organ contained only a few drops of pale, hazy urine.

Brain pale and oedematous.

“Impression” smears from Spleen, Liver, Kidney and Lung and also smears from the heart-blood showed no parasites or malarial pigment.

The urine was diluted with distilled water and centrifugalised. A heavy disc of albumen resulted from the addition of nitric acid to the fluid. The sediment was so profuse in bladder cells, that it was not possible to distinguish tube casts.

Microscopical examination of the organs confirmed the macroscopic diagnosis of Yellow Fever.

The liver showed a very advanced fatty degeneration somewhat unevenly distributed so that small groups of hepatic cells remained, showing only cloudy swelling. The normal outline of the lobules was entirely lost. There were numerous areas of capillary haemorrhage.

The fibrous tissue was slightly increased.

The kidney showed fatty changes in the glomerular tufts and in the convoluted tubules.

The cells lining Bowman's capsules had desquamated. Necrosis and desquamation of the lining cells of the tubules generally were well marked. There were few capillary haemorrhages. There was a considerable fibrous tissue increase.

The spleen showed dense leucocytic infiltration and there were many areas of haemorrhage.

The lungs showed hypostatic congestion.

The brain showed nothing abnormal.

It was concluded that death had occurred at the time when haemorrhages were taking place in the stomach. The jolting during transference from ship-board to mortuary had expelled the blood through the mouth.

TYPHOID AND PARATYPHOID FEVER.

Twenty-one specimens of blood serum were received during the year, to test against the typhoid and paratyphoid bacilli.

Most of the samples came from the Northern Provinces of Nigeria, where there appears to be more cases of typhoid fever than in the Southern Provinces.

Six sera agglutinated—*Bacillus paratyphosus A* only, four agglutinated *Bacillus paratyphosus B* only, and two agglutinated *Bacillus typhosus* only.

Other two sera agglutinated both types of the paratyphoid bacilli.

The remaining cases were negative.

During these tests, the sera were always put up against the *Micrococcus melitensis* also, but except in one case where there was a partial agglutination, all were negative.

TRYPANOSOMIASIS.

Trypanosomes of the gambiense type were found in the blood of one native, from Calabar.

Smears from the gland-juice of five natives, were examined, but trypanosomes were found only in one (the same patient as above).

Amongst the lower animals, the blood of six dogs was examined, with negative results.

Blood smears from six duikers, two hartebeest, two water buck, one monkey, one cow, and one goat also showed no parasites.

Trypanosomes of the pecorum type were found in the only two pigs examined.

Out of 4 reed buck, trypanosomes of the vivax type were observed in three.

Of 3 horses, two were infected with trypanosomes resembling pecorum, and one with vivax.

MALARIA.

Blood smears from 43 Europeans and 185 natives have been examined.

The parasite of subtertian malaria was found in 6 Europeans, being associated with the parasite of benign tertian in one. The parasite of quartan malaria was noted in two.

Amongst the natives the subtertian form was found in two adults, (along with the benign tertian in one) and the quartan parasite was also found in one. Twenty-nine of the natives were children and in this class the quartan parasite was found in 7 cases and the subtertian in five.

TUBERCULOSIS.

Five specimens of tubercular disease of the lungs were received. They were all from natives and three were from Calabar.

Nineteen samples of sputum were examined for the tubercle bacillus.

The finding was positive in eight, one of these cases being a European.

Amongst the lower animals, tubercle bacilli were found in nodules in the liver from one chicken and also in the lungs and bronchial glands of a cow slaughtered in Lagos.

TUMOURS.

Pieces of tumour-mass received for examination, numbered nineteen.

Histologically they proved to be Epithelioma three, Scirrhus cancer two, (Pancreas and Stomach) Sarcoma two. Myxochondroma one, Fibroma nine, and simple ulceration, two cases.

Two specimens of fibroma were obtained from cows slaughtered in Lagos.

GENERAL HISTOLOGY.

The following list shows the number of tissues examined:—

Liver	... 21	Glands	... ... 4	Pancreas	... 3
Kidney	... 14	Ovary	... ... 4	Stomach	... 3
Spleen	... 13	Brain	... ... 3	Heart	... 2
Lung	... 11	Uterus	... ... 3	Intestine	... 2
		Spinal cord	... ... 1.	Appendix	... 1.

Amongst the lower animals there were received tissues from the following:—

Cow ...	... 5	specimens, acute Pleuro-pneumonia.
	... 1	infarction of lung.
Pig ...	... 1	acute Pleuro-pneumonia.
Ram ...	... 1	" "
Sitatunga ...	1	" "
Horse ..	1	(spleen and liver, Anthrax).

OTHER CLINICAL MATERIAL.

Smears:—

Gland juice ... 5	Nasal secretion ... 3	(all with <i>B. lepra</i>).
Abscess ... 4	From lung ... 1	
From brain ... 2	From Urethral dis-	
From spleen ... 3	charge ... 11	
From Cerebro-	From chancre ... 6	
spinal fluid... 3	From pericardial fluid 1	
From fluid in elbow joint... 1	Blood smears ... 228	
Sputum ...20		

Hæmoglobin estimations 103. Total leucocytic counts 103. Total red cell counts 103. Differential leucocyte counts 149.

Analysis of urine 19. Examination of faeces 493.

Two urinary calculi and one set of gall-stones were obtained. One specimen of *Tinea uugium tropicalis* was received.

Under certain exceptional circumstances several vaccines were prepared.

The case of *Pyrosis mansoni*, referred to in the 1915 Annual Report, required a second course of Vaccine treatment, which, like the first, cleared up the condition very rapidly.

The Wassermann test was also applied in a few exceptional cases.

During the absence of the Government Chemist on leave, several examinations of water and various plants and poisons were made.

MEDICAL ENTOMOLOGY.

January.—Specimens of *Hippobosca maculata* and of *Glossina palpalis* were taken at Yaba. *Culiciomyia nebulosa* and *Anopheles costalis* were obtained in Lagos.

February.—*Culiciomyia nebulosa*, *Culex thalassius*, *Ochlerotatus irritans* were sent from Lagos.

March.—*Glossina palpalis* was caught at Yaba. *Stegomyia fasciata*, *Culex thalassius*, *Anopheles costalis* and *Culiciomyia nebulosa* were forwarded from Lagos.

August.—Mosquitos, bred from larvae at Port Harcourt were identified as *Culex duttoni* (41) *C. consimilis* (13) *C. pruina* (4) *C. tigripes* (2), *Culiciomyia nebulosa* (14), *Stegomyia fasciata* (5).

Specimens of *Glossina caliginea*, and a larva of *Cordylobia anthropophaga* were also obtained from this station during this month.

September.—*Anopheles funestus* and *Tabanus taeniola* were caught at Obubra. *Stegomyia africana* was obtained from Ikom, also *Hippocentrum versicolor*. *Stegomyia luteocephala* and *Mansonioides uniformis* were taken at Adun. *Tabanus thoracicus* was taken at Yaba.

October.—Mosquitos bred from larvae at Brass were identified as *Culex thalassius* (55), *C. tigripes* (1), *Culiciomyia nebulosa* (12), *Anopheles costalis* (6), *Ochlerotatus nigricephalus* (5), *Stegomyia africana* (3).

Adult mosquitos caught there were *Anopheles costalis* (17), *Ochlerotatus nigricephalus* (13), *Culiciomyia nebulosa* (1) and *Stegomyia africana* (1). Four specimens of *Glossina palpalis* were also taken.

During this month also *Tabanus teniota*, *T. socialis*, and *T. ruficrus* were obtained at Ikom, also *Chrysops silacea*, *Glossina palpalis*, *G.*

caliginea, *Simulium damnosum*, *Anopheles costalis*, *Stegomyia africana*, *Mausonioides africanus*, *Culiciomyia nebulosa*, *Banksinella luteolateralis*, *Culicoides grahami*, *Ctenocephalus canis*, and *Cimex rotundatus*.

Three specimens of *Glossina palpalis* were taken at Yaba.

November.—*Tabanus ruficrus*, *T. sagittarius*, *T. kingsleyi*, *T. secedens*, *T. quadrisignatus*, *Glossina palpalis*, *G. fusca*, *Chrysops silacea*, *Anopheles mauritianus*, *A. theileri*, *A. nili*, *Stegomyia fasciata*, and *Stegomyia africana* were obtained at Ikom.

Chrysops silacea and *Glossina palpalis* were taken at Ilaro.

From Benin City and district there were received *Glossina palpalis* (17), *Chrysops silacea* (4), *Tabanus fasciatus*, *T. socialis*, *T. secedens*.

Five specimens of *Glossina palpalis* and 3 *Mausonioides africanus* were sent from Afikpo.

In December, *Glossina palpalis* was taken at Yaba.

Fifteen Specimens of *Tabanus combustus* were received, six of *T. besti*, three of *T. secedens* also *Glossina palpalis* and *Chrysops silacea*, taken on the Cross River and the creeks at Itu.

Other blood-sucking insects received, but date of capture not stated, were *Boophilus annulatus* (4), *Rhipicephalus sanguineus* (9), *Amblyomma variegatum* (1) (from horses and dogs) at Bende; *Glossina palpalis* (7) *G. tachinoides* (2) *Chrysops silacea* (5), *C. longicornis* (2), *Hippocentrum versicolor* and *Stomoxyx omega*, from Ikot Ekpene and Uyo and *Glossina palpalis* (44) *Tabanus fasciatus* (12), *T. secedens* (4) *Chrysops silacea*, *Cordylobia anthropophaga*, *Hippocentrum versicolor*, *Stegomyia fasciata* (7), *Anopheles costalis*, *Mausonioides africanus* and *Mucidus mucidus* from Afikpo.

Encysted parasites in the liver of a cow slaughtered at Lagos, proved to be larvæ of *Porocephalus*.

Dissection and microscopical examination of the flies caught at Yaba, *Hippobosca maculata*, *Glossina palpalis* (6), *Culiciomyia nebulosa* (7), *Anopheles costalis* (2), *Culex thalassius* (2), *Ochlerotatus irritans* and *Tabanus thoracicus* yielded no noteworthy results.

Mosquito larvæ collected within the Municipal Boundary of Lagos, and sent for identification by the Sanitary Officer were:—

January.—*Anopheles costalis*, *Stegomyia fasciata*, *Culex rima*, *C. insignis*, *C. fatigans*, *Ochlerotatus irritans*, *Uranotaenia annulata*, *Culiciomyia nebulosa* (also *Cyclops* and *Psychodids*).

February.—*Anopheles costalis*, *Stegomyia fasciata*, *Culex insignis*, *C. thalassius*, *Ochlerotatus irritans*, *O. nigriceps*, *Uranotaenia annulata*, *Culiciomyia nebulosa*, *Micraedes inconspicuosa* (also *Cyclops*).

March.—*Stegomyia fasciata*, *Culex insignis*, *C. decens*, *C. thalassius*, *Ochlerotatus irritans*, *O. nigriceps*, *Culiciomyia nebulosa* (also *chironomids*).

April.—*Anopheles costalis*, *Stegomyia fasciata*, *Culex insignis*, *C. decens*, *C. fatigans*, *Ochlerotatus irritans*, *Culiciomyia nebulosa*.

May.—*Anopheles costalis*, *Stegomyia fasciata*, *Culex decens*, *Ochlerotatus nigriceps*, *Ochlerotatus irritans*, *Uranotaenia annulata*, *Culiciomyia nebulosa* (also *Psychodids*).

June.—*Stegomyia fasciata*, *Culex decens*, *C. insignis*, *Ochlerotatus irritans*, *O. nigriceps* (also *Cyclops*).

November.—*Anopheles costalis*, *Stegomyia fasciata*, *Culex decens*, *Ochlerotatus irritans*, *Culiciomyia nebulosa* (also *Psychodids* and *Cyclops*)

December.—*Anopheles costalis*, *Stegomyia fasciata*, *Culex decens*, *Culex fatigans*, *Culex grahami*, *Culiciomyia nebulosa* (also *Psychodids*).

At the request of the Director of Medical and Sanitary Services, a Map was prepared showing the distribution so far as is known, to date, of *Glossina* in Nigeria.

Mrs. S. L. M. Summers Connal is responsible for the identifications.

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